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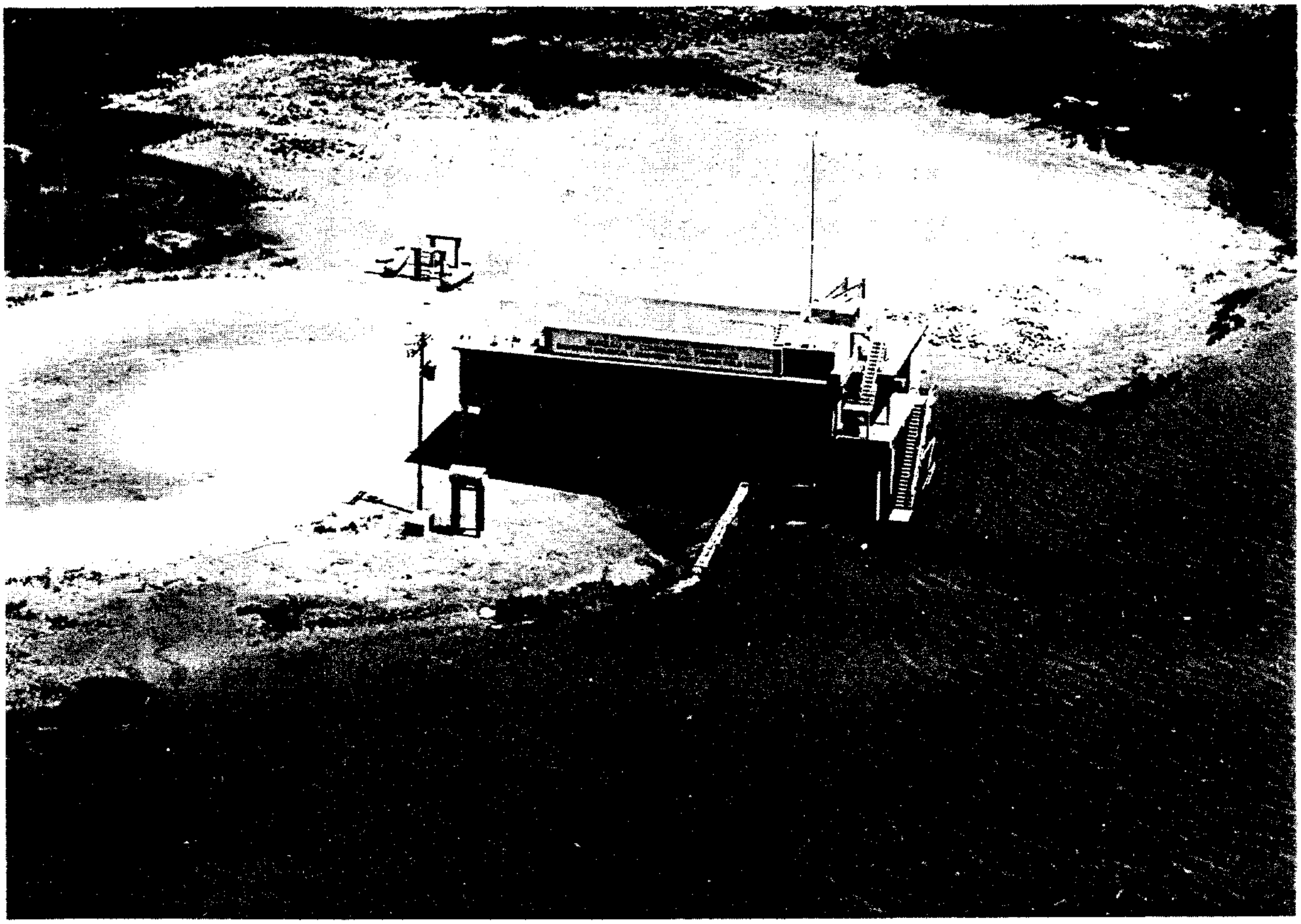

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Experimental Growth Studies With Postlarval Brown Shrimp

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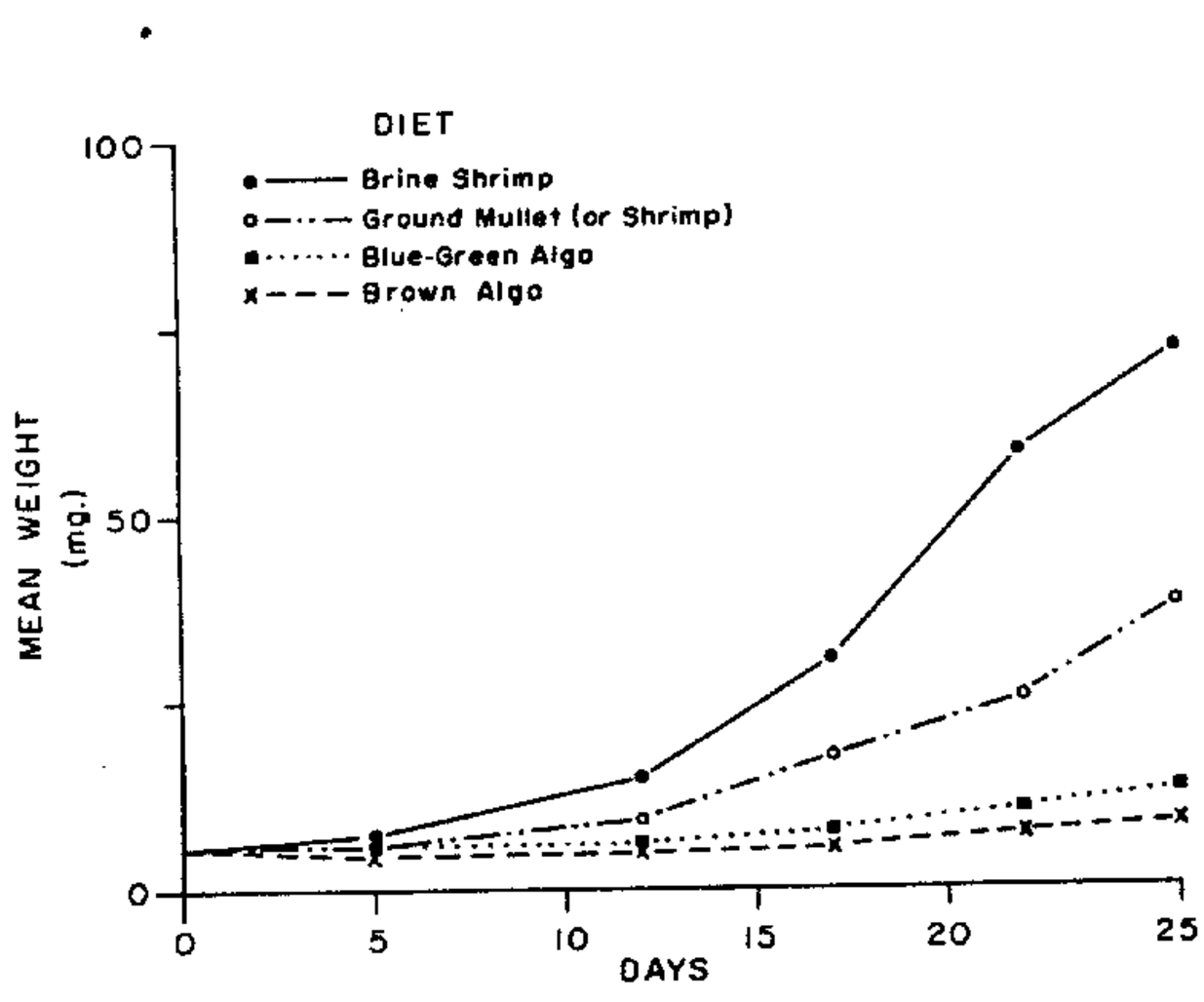
Studies of shrimp growth rate as an index of the suitability of simulated environmental conditions were begun this year. In the first series of experiments to determine a practical diet capable of supporting growth in the laboratory, we compared the growth and survival of postlarval brown shrimp fed various foods. These diets included: live brine shrimp (nauplii); brine shrimp plus a species of filamentous brown alga; the brown alga alone; ground mullet; ground shrimp; and a species of filamentous blue-green alga. Salinity in test aquaria was maintained at 25‰ with room temperature ranging from 23° to 27° C. The experiment began with 150 postlarvae per aquarium. At intervals of 5 to 7 days, 10 shrimp were removed from each test aquarium, weighed, their length measured, and preserved. The mean weight of shrimp in each test group is indicated in the accompanying figure. Data for both



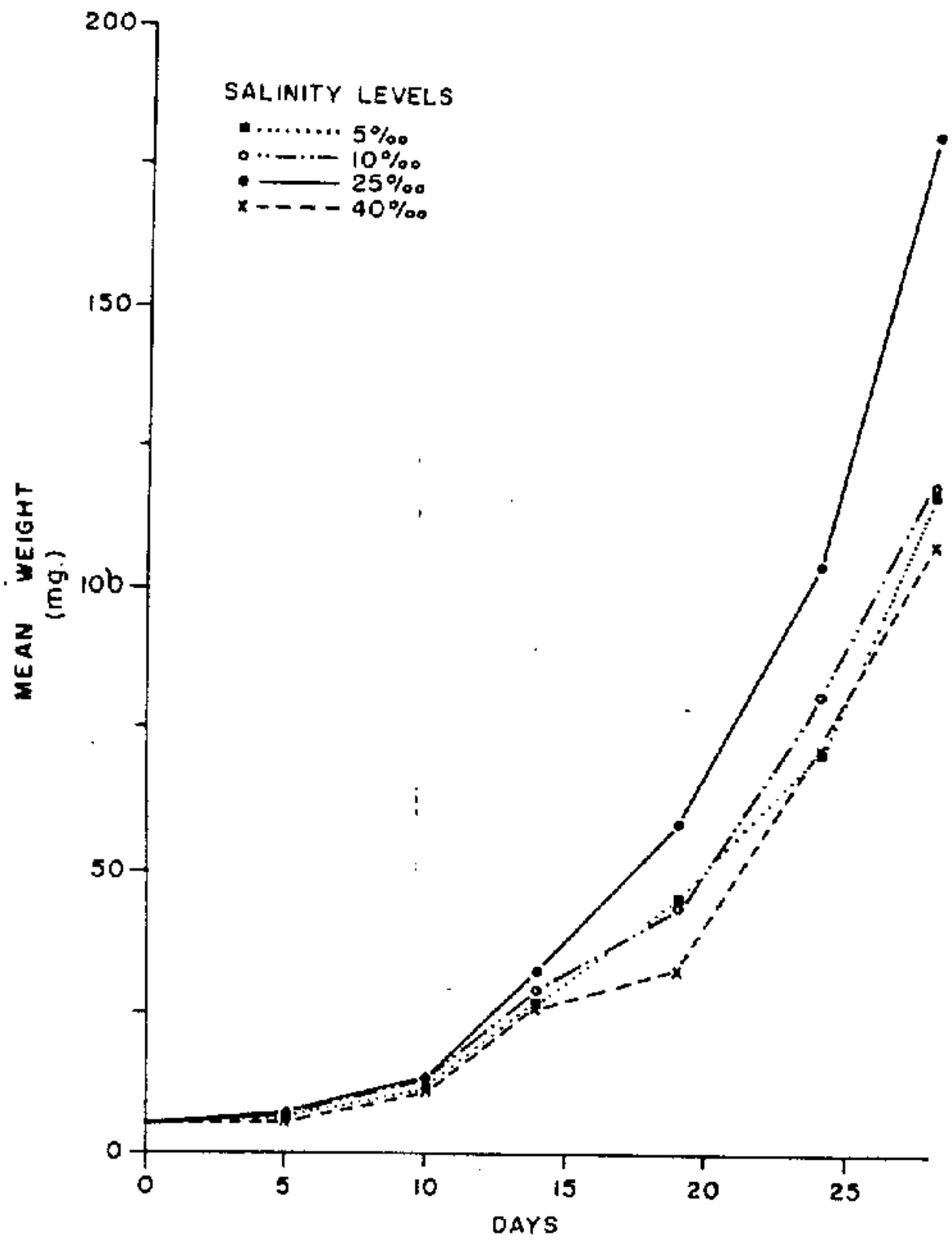
Laboratory growth of postlarval brown shrimp fed various diets. (Salinity: 25‰)

diets containing brine shrimp were combined, since the addition of the brown alga increased neither the growth nor the survival rate but merely afforded a hiding place during periods of molt. Growth data from the groups fed ground mullet and ground shrimp were similarly combined.

It is quite apparent that a diet of live brine shrimp, yielding a mean growth of 2.8 mg. per day and a maximum rate of 7.8 mg. per day, gave far better results than any of the other diets. Neither of the algal diets produced good growth, and, in addition, the rate of survival for animals fed the brown alga alone was less than half that of the animals fed brine shrimp (33 percent as against 80 percent). The ground-meat diets tended to foul the experimental aquaria, making them impractical food items. It was concluded that live-animal foods are by far the most satisfactory, not only in terms of growth

but also in terms of application and degree of utilization by the experimental animals. Food supply seemed to be a limiting factor regardless of whether or not brine shrimp were included in the diet. With the brine shrimp diet, the growth rate dropped noticeably in the experiment's later stages, during which the amount of food supplied was obviously inadequate for the number of animals present.

With brine shrimp as the only food involved, a second experiment was undertaken to determine the effects of salinity on the growth of postlarval brown shrimp. Four levels of salinity were established, viz., 5‰, 10‰, 25‰, and 40‰. These were adjusted over 48-hour periods by adding distilled or concentrated sea water to the "control" sea water (25‰) to obtain the desired level. As in the preceding experiment, 10 animals were removed at 4- or 5-day intervals for weight and length measurements. The accompanying figure shows that consistently better growth was obtained in all salinity groups than in the previous experiment with the diet group fed live brine shrimp. (cf. figure for experiment described in previous section.) This may have been partly due to the use of fewer animals in the salinity test aquaria (100 as against 150 animals in the diet experiments). There was, however, significantly greater growth at 25‰ than at any of the other salinity levels, this being noted at all stages of the experiment. No significant differences in growth could be detected among the other salinity groups. The mean rate of increase was 3.8 mg. per day (0.6 mm. per day) with a maximum in 25‰ of 9.8 mg. and 0.8 mm. per day. The greater growth at 25‰ may be related to a decreased survival rate (more food per animal), since only 36 percent of the animals survived, as against 68 percent in each of the other salinity groups.



Laboratory growth of postlarval brown shrimp at four levels of salinity. (Diet: Live brine shrimp nauplii.)

These findings suggest that for immature brown shrimp good growth and survival are possible over wide salinity ranges, provided an adequate food supply is available. This should stimulate reexamination of the hypothesis that young shrimp require low salinity levels for adequate growth.